Principles of Physical Training

ATP-CP System for Speed Work

Adenosine triphosphate (ATP) is the immediate source of energy within all cells of our body for activities such as sprinting.

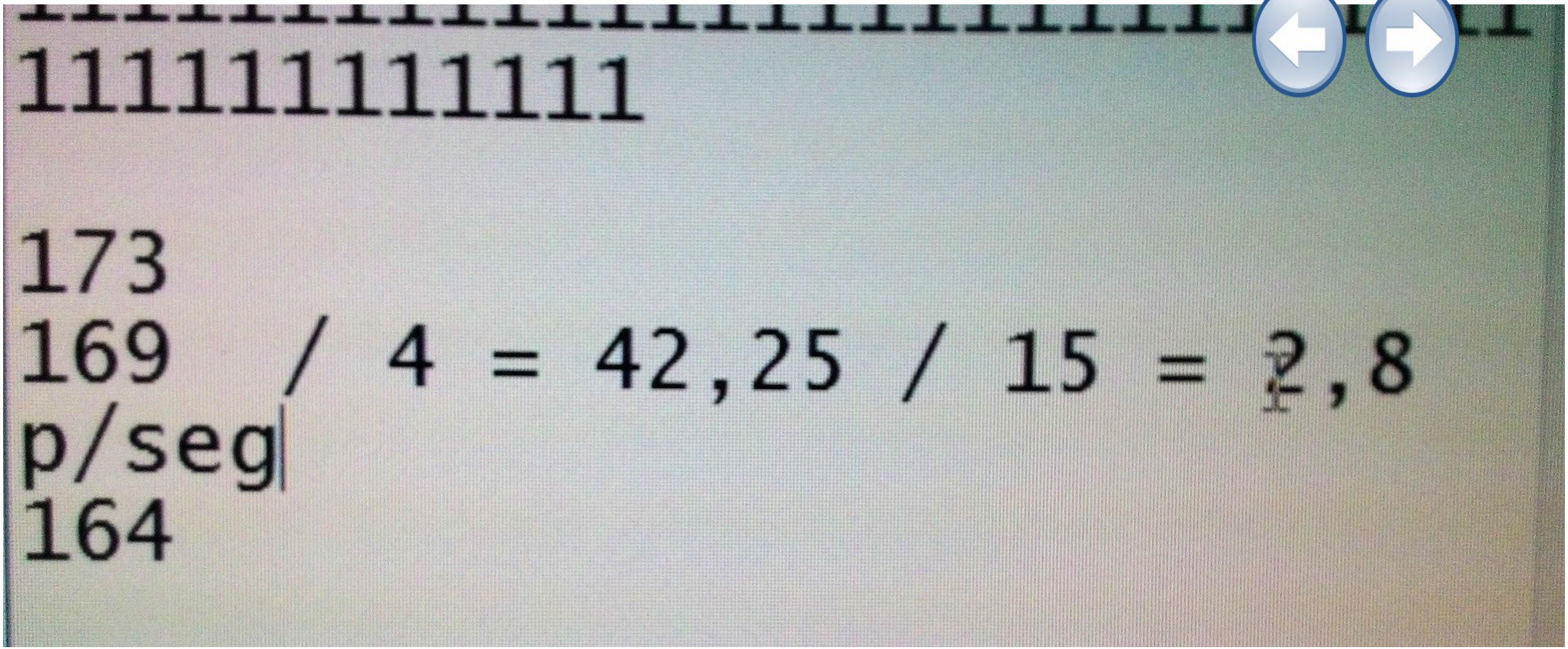
There are small stores of ATP within skeletal muscle, and these energy stores provide immediate energy to sustain physical activities for a short time. Once the ATP is used, it breaks down into adenosine diphosphate (ADP).

For regeneration of ADP into ATP for more energy, creatine phosphate (CP) is needed. It is the CP that regenerates the ATP. Without CP, ATP could provide energy for only a few seconds. With CP, the ATP-PC system can provide energy for about 30 seconds before other energy systems must take over. Thus, this ATP-CP system (outlined below), provides immediate anaerobic energy for muscle contraction.

ATP = ADP + Phosphate + Energy

ADP + CP = ATP + Creatine

1	2	3	4	5



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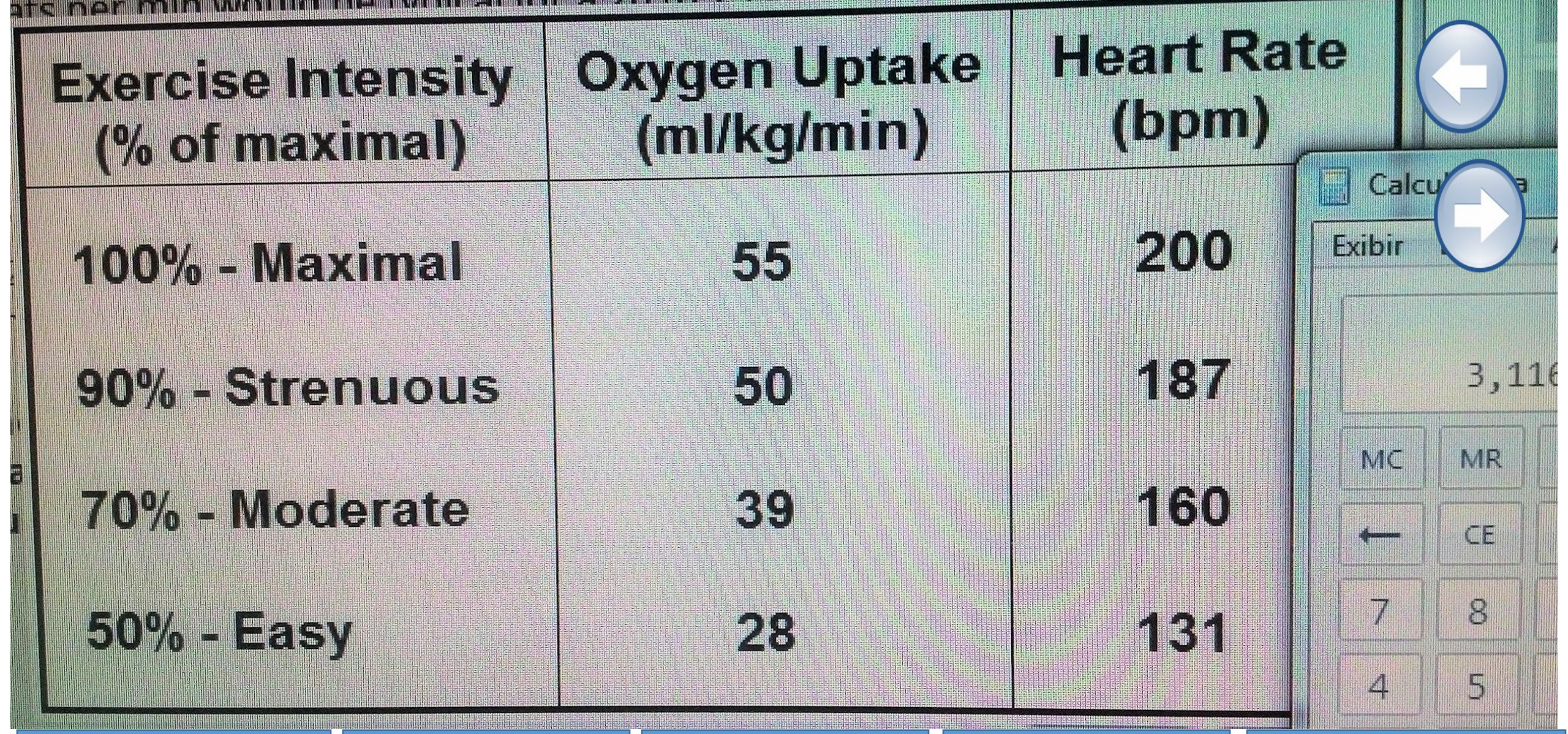
Alimentos	Proteína Animal por 100 g	Energia por 100g
Carne de frango	32,8 g	148 calorias
Carne de vaca	26,4 g	163 calorias
Queijo	26 g	316 calorias
Salmão grelhado	19,2 g	308 calorias
Pescada	19,2 g	109 calorias
Ovo	13 g	149 calorias
Iogurte	4,1 g	54 calorias
Leite	3,3 g	47 calorias

1 | 2 | 3 | 4 | 5

Physical Activity	ATP-CP System	Lactic Acid & ATP-CP System	Oxygen Aerobic System
Marathon	-	5	95
Rowing	20	30	50
Running - 100m	98	2	-
Running - 6 miles	5	15	80
Skiing Downhill – Racing	80	20	-
Skiing – Cross-Country	-	5	95
Swimming – 50m	98	2	-
Swimming – 1500m	10	20	70

1 2 3 4 5

Exercise Intensity (% of maximal)	Oxygen Uptake (ml/kg/min)	Heart Rate (bpm)
100% - Maximal	55	200
90% - Strenuous	50	187
70% - Moderate	39	160
50% - Easy	28	131



5 | 6 | 7 | 8 | 9

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5 6 7 8 9

Outdoor Activities

The typical energy requirements for various outdoor, aerobic activities, other than

Activity	Work Rate	Energy Expenditure (kcal/hr)
Bicycling	6 mph	270
	10 mph	420
	20mph	720
Skiing	Moderate	504
	Strenuous/ Uphill	1140
Jumping Rope	70 Jumps/ minute	690
	145 Jumps/ minute	840

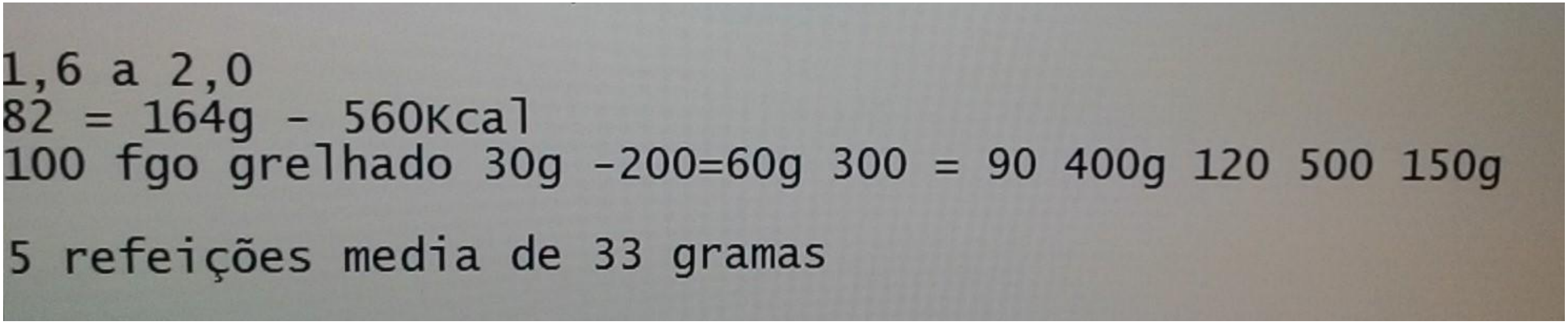
Metabolic Changes	Cardiorespiratory Changes
Increased levels of ATP, CP, glycogen	Increase in blood volume
Increased levels of anaerobic enzymes	Decreased heart rate at given workload
Increased capacity to tolerate blood lactate	Increased stroke volume
Increased levels of oxygen within muscle	Increased ability to take oxygen from blood
Increased levels of aerobic enzymes	Improvement in blood pressure
Increased capacity to use fat as fuel	Increased ability to handle heat load

5	6	7	8	9

Food	Calories / 100g	Protein / 100g	Calories / 30g Protein
Whey Protein	412	82	150
Chicken Breast	165	31	160
Icelandic Yogurt	65	11	177
Greek Yoghurt (0% Fat)	59	10	177
Chicken Thigh	209	26	241
Mars Protein Bar	350	38	276
Salmon	208	20	312
Milk (2% Fat)	50	3.3	455
Weetabix Protein	379	20	569
Weetabix Breakfast Drink	85	3.5	728
Quinoa	368	14	789
Weetabix	358	11.5	934
Porridge Oats	356	11	971

American Dietetic Association and the Dietitians of Canada reported in 2003 that vegetarians generally get *more* iron than nonvegetarians, and that vegans do best of all. That's because beans and green leafy vegetables—which vegetarians and vegans tend to eat plenty of—are loaded with iron. And many other foods are iron-fortified (breakfast cereals, for example), as you'll see on their labels.

A 1-cup serving of green vegetables provides 1-3 milligrams of iron, depending on which vegetable you choose. A 1/2-cup serving of beans provides 2-3 milligrams. A bowl of a typical iron-fortified cereal has 18 milligrams. How much iron do you need? The recommended dietary allowance for adult males and for women over 50 is 8 milligrams per day. For women aged 19-50, the RDA is 18 milligrams per day (it's higher to compensate for menstrual losses).


1,6 a 2,0
82 = 164g - 560Kcal
100 fgo grelhado 30g -200=60g 300 = 90 400g 120 500 150g
5 refeições media de 33 gramas

Estatura	Peso mínimo	Peso ideal	Peso máximo
150 cm	43 kg	47 kg	54 kg
153 cm	45 kg	49 kg	56 kg
156 cm	47 kg	51 kg	58 kg
159 cm	49 kg	53 kg	60 kg
162 cm	51 kg	55 kg	62 kg
165 cm	53 kg	57 kg	64 kg
168 cm	55 kg	59 kg	66 kg
171 cm	57 kg	61 kg	68 kg
174 cm	59 kg	63 kg	70 kg
177 cm	61 kg	65 kg	72 kg
180 cm	63 kg	67 kg	74 kg
183 cm	65 kg	69 kg	76 kg
186 cm	67 kg	71 kg	78 kg

Oxygen System for Aerobic Energy

The oxygen, or aerobic, system provides energy to support long-term steady state exercise, such as long distance running or swimming.

Muscles can use both glucose and fatty acids for energy. These fuel sources can be taken from the circulating blood and from stores within the muscle. Glucose is stored as glycogen and fatty acids are stored as "triglycerides" in the muscle. When long duration activities are performed at a slow pace more "fat" in the form of fatty acids is used for energy than muscle glycogen.

During many types of exercise, all three energy transfer systems are used at various times. The amount that each system contributes to energy metabolism is related to the duration, intensity and type of activity. In general, high intensity, short duration exercises rely mainly on anaerobic energy.